

REMARKS/ARGUMENTS

The Applicants appreciate the review of the present application as evidenced by the final Official Action. As discussed below, replacement drawings are submitted to address the objections to the drawings, the specification has been amended in light of the replacement drawings and to address the objection, and dependent claim 8 has been cancelled. In addition, Applicants respectfully traverse the other rejections of the claims. Therefore, no new issues have been raised by this amendment. In light of the previously presented amendment to claim 1 and the subsequent remarks, Applicants respectfully request reconsideration and allowance of the present application.

To address the objections to the drawings as stated in the final Official Action, Figures 3, 4, 5 and 6 of the drawings have been amended. In particular, Figure 3 is amended to show the filler material 34 as an adhesive material instead of metal. Figures 4, 5 and 6 are amended to change reference numeral 40 to 41 in order to distinguish it from reference numeral 40 in Figure 3. The appropriate portions of the specification have also been amended to address the reference numeral change in Figures 4, 5 and 6. Thus, the objections to the drawings are overcome.

The final Official Action objected to the specification because "lobes 38" on page 9, line 30 should be "lobes 32." Accordingly the specification has been amended to make the requested change. Thus, the objection to the specification is overcome.

The final Official Action also objected to claim 8 under C.F.R. § 1.75(c) as being of improper dependent form for failing to limit the subject matter of a previous claim. As such, claim 8 has been cancelled.

A. The Rejection of Claims 3-6 under 35 U.S.C. § 112, first paragraph, are Overcome

The final Official Action also rejected claims 3-6 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. In support of the rejection the final Official Action states that "Claim 1 as amended reads only on the embodiment in Fig. 3." See page 3, item 7. Applicants respectfully traverse the rejection because claim 1 as amended does not read only on the embodiment in Figure 3, it also reads on the other embodiments

described in the specification, which includes those of Figures 1 and 2. In particular, the specification includes disclosure associated with Figures 1 and 2 stating that interstices may be defined between the annular body 16, 26 and the ribs 14, 24 and at the connection point of the ribs 18, 28.

The specification also states that any type of filler material, such as chopped carbon filler mixed with resin, unidirectional or fabric prepeg, organic or inorganic foam, adhesive, honeycomb core, syntactic resin, wood, aerogel or any other compatible material, may be used to fill interstices between the annular body 16, 26 and ribs 14, 24 and/or the interstices between the ribs 14, 24 at the point of connection 18, 28. See page 8, lines 1-8. Thus, claim 1 as amended reads not only on the embodiment in Figure 3, but also on the other embodiments described in the specification, which includes those of Figures 1 and 2. As such, the combinations covered by claims 3-6 are not new matter because there is written description of the features corresponding to the limitations in claims 3-6 in the specification as originally filed. Therefore, the rejection of claims 3-6 under 35 U.S.C. § 112, first paragraph, is overcome.

B. The Rejection of Claims 1-16 under 35 U.S.C. § 102(b) are Overcome

The final Official Action rejected claims 1-16 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,097,870 to Williams. Based upon the previously presented amendment to independent claim 1 and the subsequent remarks, Applicants submit that the rejection of claims 1-16 under 35 U.S.C. § 102(b) is overcome.

The Williams '870 patent discloses composite tubing that can be bent to a radius compatible with a reasonably sized spool (Col. 2, lines 47-50). As a representative example, the embodiment of Figure 1 of the Williams '870 patent includes a composite cylindrical member 8, a composite inner core member 2 and four composite web members 6. The composite cylindrical member 8 contains fibers oriented from +/- 40 degrees to +/- 70 degrees, preferably +/- 55 degrees, and fibers oriented approximately perpendicular to the axis of the composite tubing. See Col. 2, line 57 to Col. 3, line 1 and Col. 6 lines 13-17. The inner core member 2 contains fibers that are oriented at 0 degrees to the axis of the tubing and the composite web

members 6 contain fibers oriented from +/- 40 degrees to +/- 60 degrees, preferably +/- 45 degrees, to the axis of the tubing. See Col. 3, lines 5-27 and Col. 6, lines 9-13.

Figure 1 of the Williams '870 patent also illustrates that it may be desirable to line the interior of each cell 7 with an abrasion and chemically resistant material 4 to provide a pressure tight chamber. See Col. 3, lines 60-66. In addition, the exterior of the composite tubular member may be covered with a protective abrasion resistant cover 10 to resist such wear and friction. See Col. 3, line 67 to Col. 4, line 8.

In all of the embodiments described in the Williams '870 patent, the only materials included in the cylindrical member, the core member and/or the web members are composite fibers and a plastic binder to hold the fibers together, which is described as vinyl ester, epoxy, or a thermoplastic or thermosetting resin. See Col. 3, lines 28-31 and Col. 5, lines 53-56. While a chemically resistant material 4 may line the interior of each cell 7 and the exterior of the composite member may be covered with a protective abrasion resistant cover 10, material 4 and cover 10 are only coatings on the members of the tubing. Thus, the object of the composite tubing embodiments disclosed in the Williams '870 patent is to provide tubing that is flexible enough to be wound around a spool while also strong enough to have high axial stiffness and to withstand bending stresses, internal pressure and shear stress. See Col. 2, lines 44-50. Thus, no interstices between the members are disclosed in the Williams '870 patent and, therefore, no filling is provided between portions of the materials that make up the cylindrical member, the core member and/or the web members, or where the respective members connect to one another.

In contrast, the damage tolerant shaft of the claimed invention includes an annular body that is symmetrical about an axis and ribs that extend inwardly from the annular body and connect within the interior of the annular body, such that the annular body and ribs cooperate to define voids extending lengthwise therealong. In addition, as recited by amended independent claim 1, a filler material is disposed within interstices that are defined between the annular body and the ribs and between the ribs at the point of connection. In another embodiment of the claimed invention, as recited by independent claim 9, the damage tolerant shaft includes lobes that are shaped relative to one another such that the lobes can be positioned to define an annular body and ribs extending within the annular body. In this embodiment, there is a filler disposed

between portions of adjacent lobes. Thus, as described on page 8, lines 1-8 (with amended line 2) and page 9, lines 1-4, the interstices between the annular body and the ribs, between the ribs at the point of connection, and/or between adjacent portions of the lobes may be filled with any type of filler material, such as chopped carbon filler mixed with resin, unidirectional or fabric prepreg, organic or inorganic foam, adhesive honeycomb core, syntactic resin, wood, aerogel or any other compatible material. In addition, the location of the filler material 34 is illustrated in Figure 3, where it is shown in the interstices between the annular body and the ribs, between the ribs at the point of connection and between adjacent portions of the lobes. As such, whether the damage tolerant shaft of the present invention is made of metallic or composite materials, the interstices of the shaft may be filled with any type of filler material as described above, which is separate from the material that makes up the annular body, ribs, and/or lobes of the shaft

While the Williams '870 patent describes composite tubing that includes a composite cylindrical member 8, a composite inner core member 2 and four composite web members 6, the Williams '870 patent does not describe interstices between any of the members and as such, the Williams '870 patent does not describe filling an interstice as claimed by previously presented independent claim 1 and independent claim 9. In particular, the Williams '870 patent does not describe any type of filling or any other material between the cylindrical member, the core member and/or the web members, nor is there any filling or any other material where the respective members connect to one another. Instead, the composite material described in the Williams '870 patent is apparently formed to construct the respective members of the composite members without any interstices at any point(s) of connection between the respective members. While the filler material of the claimed invention may be made of composite fibers and a binder/matrix material, the filler material is not part of any of the structural elements of the damage tolerant shaft. Instead, the filler material described in previously presented independent claim 1 and independent claim 9 is separate from the annular body, ribs, and/or lobes of the damage tolerant shaft by filling in the interstices between the respective members of the shaft in order to provide added structural integrity to the shaft.

In addition, although the Williams '870 patent states that a chemically resistant material 4 may line the interior of each cell 7 and that the exterior of the composite member may be

covered with a protective abrasion resistant cover 10, material 4 and cover 10 are only coatings on the members of the tubing. Accordingly, material 4 and cover 10 are not analogous to the lobes and annular body, respectively, as described by the claimed invention, because the lobes and annular body are the structural members of the damage tolerant shaft, not simply coatings like material 4 and cover 10 of the Williams '870 patent. Additionally, the cylindrical member 8, inner core member 2 and web members 6 described in the Williams '870 patent are structural members and are not analogous to the filler located in interstices between the structural members as described in the claimed invention. As such, the Williams '870 patent does not teach or suggest interstices defined between the members of a shaft, let alone a filler material disposed in the interstices, as recited by previously presented independent claim 1 and independent claim 9.

Similarly, none of U.S. Patent No. 2,340,926 to Bradley, U.S. Patent No. 4,374,881 to Hamilton, French Patent No. 964,069 to Fernez or U.S. Patent No. 3,110,754 to Witort et al., taken either individually or in combination, teach or suggest interstices defined between the members of a shaft, let alone a filler material disposed in the interstices, as recited by previously presented independent claim 1 and independent claim 9.

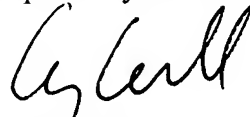
Since none of the cited references, taken either individually or in combination, teach or suggest the damage tolerant shaft of previously presented independent claim 1 and independent claim 9, Applicants respectfully submit that the rejection of these claims is overcome. Since the dependent claims include each of the recitations of a respective independent claim, the rejection of the dependent claims is also overcome for at least the same reasons as described above in conjunction with the independent claims.

CONCLUSION

In view of the current and previously presented amendments and the remarks presented above, it is respectfully submitted that all of the present claims of the present application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper. However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,

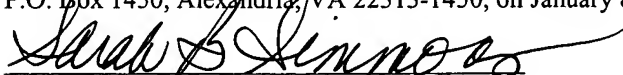


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APPENDIX

Figs. 3, 4, 5, 6 (Pages 2/3, 3/3)

Replacement Sheets (Pages 2/3, 3/3)